CLAIMS

1. A method for the controlled continuous cooling of a fluid in the liquid state by using a cooling fluid consisting of a liquefied gas contained in a tank (5), said liquid to be cooled being of food type or of other type, said liquid also being single-phase or multi-phase and possibly also containing solid bodies, said method comprising feeding said liquid to be cooled into a containing and heat transfer member (4), also feeding into said member (4) a suitable quantity of cooling fluid, such as a liquefied gas, taken from the tank (5) connected to said member (4) by at least one conduit (6), said cooling fluid entering into direct contact in said member with said liquid to be cooled, said contact leading to the transformation of the cooling fluid into a gaseous or vapour phase and the cooling of said liquid to be cooled, characterised in that said cooling fluid in the gaseous state and said cooled fluid are then directly extracted from the containing member (4) in a manner already separated.

2. A method as claimed in claim 1, characterised in that the contact between the cooling fluid, or liquefied gas, and the liquid to be cooled takes place at a pressure greater than atmospheric.

3. A method as claimed in claim 2, characterised in that the cooling fluid or liquefied gas fed to the containing and heat transfer member (4) is pressurized.

4. A method as claimed in claim 2, characterised in that the pressure in the containing and heat transfer member (4) is used to evacuate the cooled fluid from said member.

5. A method as claimed in claim 2, characterised in that the pressure in the containing and heat transfer member (4) is regulated by

the pressure drop through a valve (19) positioned in a discharge conduit for the liquefied gas transformed into the gaseous phase after heat transfer with the fluid to be cooled.

6. A method as claimed in claim 2, characterised in that the pressure in the containing and heat transfer member (4) is regulated on the basis of the level of the fluid to be cooled in said member (4).

7. A method as claimed in claim 1, characterised in that the liquefied gas is chosen from N2, CO2 and Ar.

8. A method as claimed in claim 1, characterised in that the cooled liquid and the liquefied gas, this latter in the gaseous phase following heat transfer, are extracted from the containing and heat transfer member (4) at the upper and lower ends of this member.

9. A method as claimed in claim 8, characterised by inserting gas or vapour into the containing and heat transfer member (4) to facilitate mixing between the liquid to be cooled and the liquefied gas.

10. A method as claimed in claim 9, characterised in that the inserted gases or vapours are of the same type as the liquefied gas.

11. A method as claimed in claim 9, characterised in that the inserted gases or vapours are of a different type from the liquefied gas.

12. A method as claimed in claim 1, characterised by continuously controlling the temperature, the pressure and the level of the fluid in the containing and heat transfer member (4).

13. A method as claimed in claims 9 and 12, characterised in that the gas or vapour is inserted into the containing and heat transfer member in accordance with the physical characteristics of the liquid to be cooled which is present in said member.

14. A plant for implementing the method claimed in claim 1, said plant comprising a tank (5) of liquefied gas, said tank (5) being connected by at least one conduit (6) to a containing and heat transfer member (4), to said member (4) there being connected at least one conduit (3) for feeding a liquid to be cooled, this latter being arranged to be cooled in the interior of the containing and heat transfer member (4), said member (4) comprising a single internal chamber to which the aforesaid conduits (3, 6) are connected and within which the liquefied gas and the liquid to be cooled come into direct contact, characterised in that said member (4) comprises discharge conduits (14, 18) through which said fluids are separately extracted after their mutual direct contact.

15. A plant as claimed in claim 14, characterised in that the conduit (6) for the liquefied gas is connected to the containing and heat transfer member (4) via an injector (7) with a sized hole (7a) for the entry of said liquefied gas into said member.

16. A plant as claimed in claim 14, characterised in that the conduit (6) for the liquefied gas is connected to the containing and heat transfer member (4) by a pipe provided with a flow control valve.

17. A plant as claimed in claim 15, characterised by connecting to the liquefied gas conduit (6), upstream of the injector (7), a conduit (9) for feeding gas or vapour to said injector when the flow of liquefied gas to the containing and heat transfer member through the conduit (6) ceases.

18. A plant as claimed in claim 14, characterised in that the discharge conduit (18) through which the liquefied gas which has passed into the gaseous phase after heat transfer with the liquid to be cooled is extracted, is connected to a circuit unit comprising conduits (22, 26) and

injector (23) to withdraw part of said gas or vapour from said discharge conduit (18) and to inject it into the containing and heat transfer member (4) in order to facilitate mixing of the liquefied gas with the liquid to be cooled.

19. A plant as claimed in claim 18, characterised in that the circuit unit is connected to a feed conduit (24) for powering fluid.

20. A plant as claimed in claim 18, characterised by comprising a further conduit (20) connected to a lower part of the containing and heat transfer member (4) in order to feed gas or vapour into said member to facilitate mixing of the liquefied gas with the liquid to be cooled.

21. A plant as claimed in claim 14, characterised in that the conduit (18) for discharging the cooling fluid from the containing and heat transfer member comprises a valve member (19) enabling the pressure in the interior of said member to be regulated.

22. A plant as claimed in claim 14, characterised by comprising plant control means connected to measurement means for the temperature (13) and/or the pressure and/or the level of the fluids within the containing and heat transfer member.